

CASE REPORTS

depends on the degree of function in the renal segment drained by the ureter. Most ectopic ureters opening into the vagina drain from renal segments so hydronephrotic and dysplastic that a nephroureterectomy is the best treatment.³ Most such ureters drain the upper pole of a duplicated system, though occasionally a single ectopic ureter is found draining a dysplastic kidney.²¹

Occasionally an ectopic ureter is encountered with sufficient function remaining to warrant an attempt at salvage. This decision might be made when function in the renal segment is demonstrated on intravenous urography or on renal scan, or by the finding at operation of enough renal parenchyma to suggest future renal functional return. Salvage can be accomplished by a variety of methods involving reimplantation of the ectopic ureter.^{5,22}

Some authors suggest removing the upper pole of the kidney and proximal portion of its ureter and leaving the distal ectopic ureter intact because of their fear of devascularizing or otherwise injuring the distal portion of the companion ureter.³ We have not chosen this approach as it appears to us that when the child becomes a sexually active adult, the retained segment of dilated, poorly draining ureter must certainly serve as a constantly infected perivaginal diverticulum. Other problems may arise from the retained ureteral segment as well.²³ Instead, we remove the ureter to its junction with the vagina and oversew the vagina at that point. Meticulous attention to surgical technique will prevent injury to the adjacent distal ureter.

Conclusion

Vaginal ectopic ureter results from faulty embryogenesis and results in characteristic symptomatology. Extensive evaluation to exclude the diagnosis is mandatory because failure to diagnose the condition can lead to significant psychologic and physical morbidity. Workup involves a logical sequence of radiographic and endoscopic studies and can be done safely and rapidly. Effective curative surgical therapy is available.

REFERENCES

1. Delph WI, Patrick CE, Schlossberg I: Ureteral duplication with obstruction. *J Natl Med Assoc* 1976 Mar; 68(2):125-128
2. Mackie GG, Awang H, Stephens FD: The ureteric orifice: The embryologic key to radiologic status of duplex kidneys. *J Pediatr Surg* 1975 Aug; 10(4):473-481
3. Malek RS, Kelalis PP, Stickler GB, et al: Observations on ureteral ectopy in children. *J Urol* 1972 Feb; 107(2):308-313
4. Hartman GW, Hodson C: The duplex kidney and related abnormalities. *Clin Radiol* 1969 Oct; 20:387-400
5. Leary FJ, Bass RB Jr, Symmonds RE: Watery vaginal discharge in a young woman (Clinical Conference). *J Urol* 1979 Aug; 122(2):226-229
6. Burford C, Glenn J, Burford E: Ureteral ectopia: A review of the literature and two case reports. *J Urol* 1949 Aug; 62(2):211-218
7. Schulman CC: The single ectopic ureter. *Eur Urol* 1976; 2(2):64-69
8. Blundon K, Lane J: Diagnostic difficulties in ureteral ectopia. *J Urol* 1960 Sep; 84(3):463-469
9. Allerker A: The extravesical ectopic ureter. *Br J Surg* 1958 Jan; 45(192):344-353
10. Greene LF: Ureteral ectopy in females. *Clin Obstet Gynecol* 1967 Mar; 10(1):147-154
11. Johnston JH: Problems in the diagnosis and management of ectopic ureters and ureteroceles. In *Problems in Pediatric Urology*. Amsterdam, Excerpta Medica, 1972, pp 57-78
12. Brannan W, Henry HH II: Ureteral ectopia: Report of 39 cases. *J Urol* 1973 Feb; 109(2):192-195
13. Greene LF: Ureteral ectopy in females. *Surg Clin North Am* 1959 Aug; 39(4):989-994
14. Ogawa A, Kakizawa Y, Akaza A: Ectopic ureter passing through the external urethral sphincter: Report of a case. *J Urol* 1976 Jul; 116(1):109-110
15. Persky L, Noseworthy J: Adult ureteral ectopia. *J Urol* 1976 Aug; 116(2):156-159
16. Simms MH, Higgins PM: Diagnosis of the occult ectopic ureter in a duplex kidney. *J Urol* 1975 Nov; 114(5):697-699
17. Borski A, Parsons R: Ureteral ectopia. *US Armed Forces Med J* 1960 Aug; 9(3):1213-1216
18. Gibbons MD, Duckett JW Jr: Single vaginal ectopic ureter: A case report. *J Urol* 1978 Oct; 120:493-495
19. DeShadarevian JJ, Ward JN, Lavengood RW: Simple method for diagnosis of ureterovaginal fistula. *Urology* 1979 Sep; 14(3):265-266
20. Katzen P, Trachtman B: Diagnosis of vaginal ectopic ureter by vaginogram. *J Urol* 1954 Nov; 72(5):808-811
21. Mandell J, Stevens PS, Lucey DT: Management of the unsuspected ectopic ureterocele. *J Urol* 1978 Oct; 120(4):496-498
22. Moore T: Ectopic openings of the ureter. *Br J Urol* 1952 Mar; 24(1):3-18
23. Kelalis PP, Kind LR, Belman AB: *Clinical Pediatric Urology*. Philadelphia, WB Saunders, 1976, pp 528-541

Refer to: Goldbach PD, Mohsenifar Z, Abraham JL, et al: Talcum powder pneumoconiosis: Diagnosis by transbronchial biopsy using energy-dispersive x-ray analysis. *West J Med* 1982 May; 136:439-442

Talcum Powder Pneumoconiosis

Diagnosis by Transbronchial Biopsy Using Energy-Dispersive X-ray Analysis

PETER D. GOLDBACH, MD
ZAB MOHSENI FAR, MD
Los Angeles

JERROLD L. ABRAHAM, MD
San Diego

WILLIAM I. YOUNG, MD
WAYMAN D. MERRILL, MD
Los Angeles

ALTHOUGH COSMETIC TALC is widely used as a dusting powder, it is not generally considered to be a hazard.¹ During its usual use, relatively small quantities are inhaled,² and inhaled particles are efficiently cleared by the tracheobronchial tree.

From the Division of Pulmonary Medicine, Cedars-Sinai Medical Center, UCLA School of Medicine, Los Angeles, and Department of Pathology, UC San Diego School of Medicine, San Diego.

Submitted, revised, June 15, 1981.

Reprint requests to: Zab Mohsenifar, MD, Division of Pulmonary Medicine, Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048.

CASE REPORTS

Whereas cosmetic talcum products sold in the United States contain variable amounts of pure talc, they are considerably less contaminated with asbestos and other minerals than are commercial grades of talcum.³ In people who are exposed to commercial grades of talc, a clinical syndrome may develop with pulmonary fibrosis resembling that produced by exposure to asbestos. The effects may be due to contamination by asbestos, but the fibrous form of talc itself may play a role as it has been shown that platelike crystals can be taken up by tissue phagocytes and are potentially fibrogenic.⁴ There have been few reports of lung disease in adults attributed to the inhalation of cosmetic talc.⁵⁻⁷ We report a case of pulmonary talcosis due to the intentional sniffing of large quantities of cosmetic talcum powder.

Report of a Case

A 40-year-old woman was seen for preoperative pulmonary evaluation during a bout of cholecystitis. She noted a 15-year history of gradually progressive exertional dyspnea and was now dyspneic after walking 1½ blocks. There was no history of cough, wheeze or fever or of tuberculosis or pneumonia. She had a 40-pack-year smoking history and was currently smoking 1½ packs a day. The patient was a housewife, had worked outside the home as a receptionist for only six months ten years ago and gave no history of exposure to

asbestos, other silicates or dusty environments. She said she had no history of drug abuse.

The physical examination was remarkable for tachypnea with a respiratory rate of 20 per minute, scattered rhonchi and decreased breath sounds at both bases. Chest roentgenogram showed a diffuse reticulonodular interstitial infiltrate with conglomerate masses in both midlung zones. There was evidence of retraction of these masses toward the hila and volume loss was seen at both bases. There was no notable change in comparison with films obtained eight months before this admission. No pleural plaques were noted (Figure 1). Pulmonary function testing showed combined moderate obstructive and restrictive defects. Single-breath diffusing capacity for carbon monoxide was 58 percent of its predicted value and was normal after correcting for the lung volume at which it was measured. Sec-

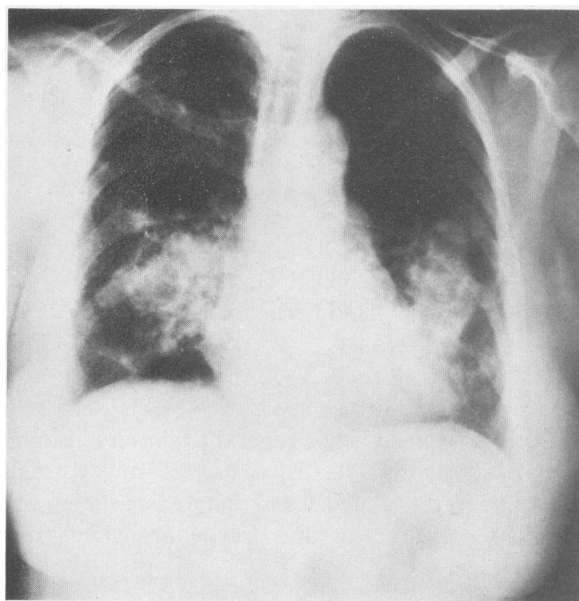


Figure 1.—Photograph of a chest roentgenogram showing a diffuse reticulonodular infiltrate with conglomerate masses in both midlung zones.

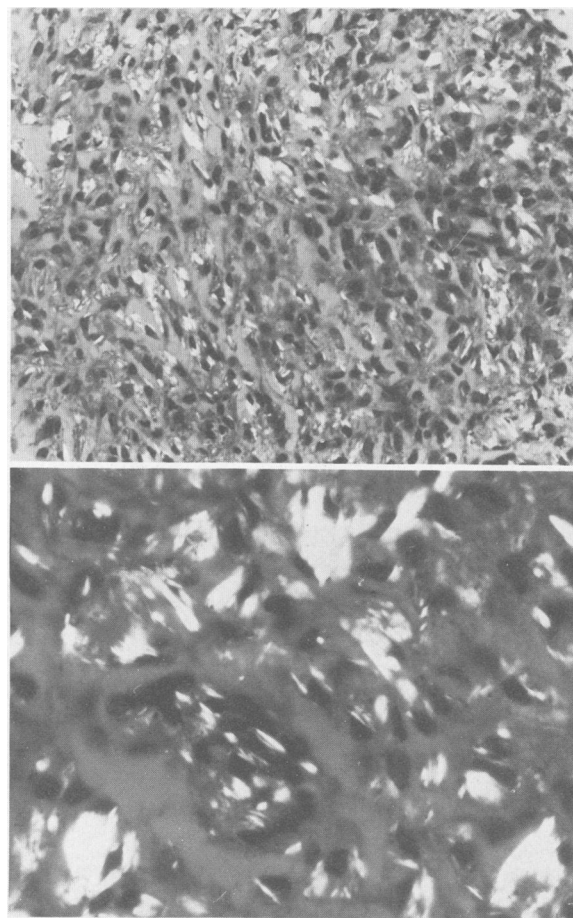


Figure 2.—Photograph of a transbronchial biopsy specimen showing dense cellular tissue containing many strongly birefringent particles. (Top, reduced from magnification $\times 300$.) Bottom, higher magnification (reduced from $\times 1,000$) partially polarized.

CASE REPORTS

ond-strength purified protein derivative (PPD) and coccidioidin skin tests were negative and gallium scan of the lung showed diffuse uptake in the midlung areas. Fiberoptic bronchoscopy did not reveal endobronchial lesions and transbronchial biopsy histologically yielded densely cellular tissue infiltrated with macrophages and giant cells. There was no necrosis and special stains were negative for acid-fast bacilli and fungi. Under polarized light there were innumerable birefringent platelike particles seen throughout the tissue specimen (Figure 2).

A single section from the hematoxylin- and eosin-stained slide was examined using scanning electron microscopy (SEM) with energy-dispersive x-ray analysis (EDXA).⁸ SEM revealed innum-

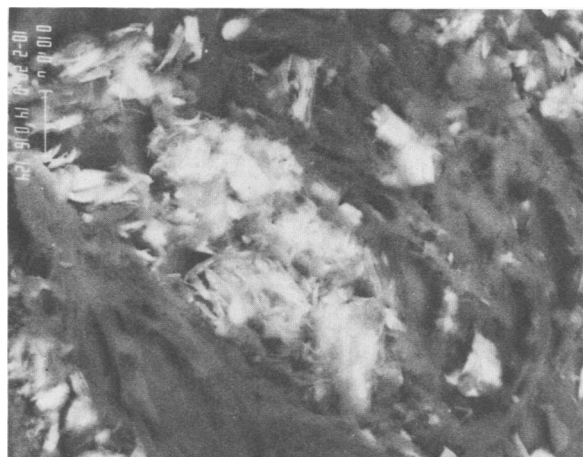


Figure 3.—Photograph of lung specimen seen via scanning electron microscopy. Backscattered electron image shows numerous particles in section.

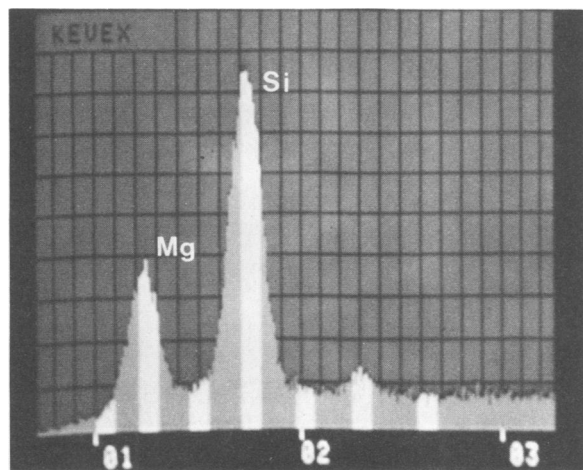


Figure 4.—Energy-dispersive x-ray analysis of particles seen on scanning electron microscopy. Peaks for magnesium (Mg) and silicone (Si) are consistent in ratio with talc ($\text{Mg}_3\text{Si}_2\text{O}_{10}(\text{OH})_2$).

erable intracellular platelike talc particles and many fibers (Figure 3). On EDXA over 95 percent of the particles were found to be composed of magnesium (Mg) and silicon (Si) in a ratio consistent with talc ($\text{Mg}_3\text{Si}_2\text{O}_{10}(\text{OH})_2$) (Figure 4). Smears of sputum were similarly examined by both light microscopy and SEM and innumerable talc-laden intact macrophages plus ferruginous bodies were identified (Figure 5).

After the diagnosis was established, detailed questioning revealed that the patient had repeatedly sniffed handfuls of talcum powder two or three times daily for one to two months during two bouts of postpartum depression and years ago. She said there had been no recent episodes of sniffing talcum. Follow-up pulmonary function tests obtained a year after the initial evaluation were essentially unchanged.

Discussion

Pneumoconiosis may develop in talc miners and other workers who are exposed to high concen-

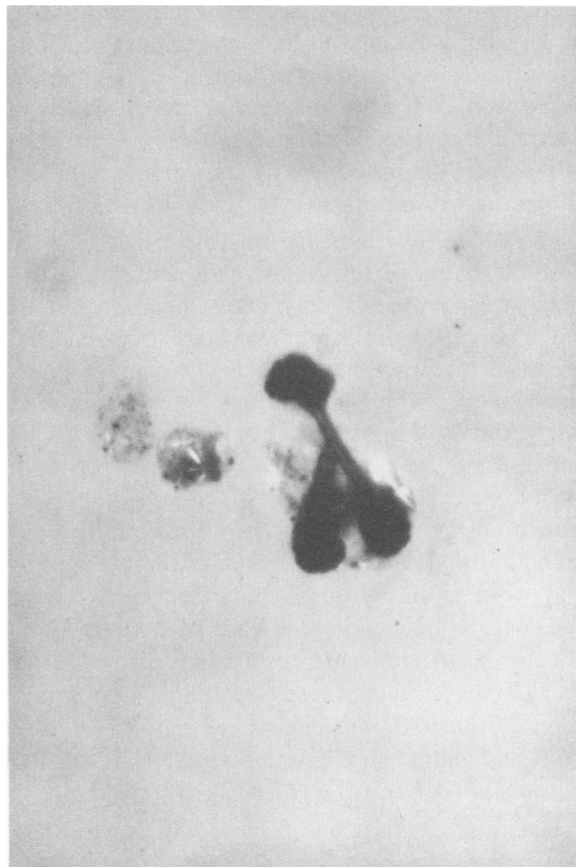


Figure 5.—Photograph of a sputum smear with clusters of macrophages containing numerous birefringent particles. Also seen is a ferruginous body. (Iron stain, partially polarized, reduced from magnification $\times 300$).

CASE REPORTS

trations of talc dust for prolonged periods. This is characterized by a long symptom-free interval followed by the gradual development of cough and dyspnea and interstitial infiltrates with pleural plaques seen on chest roentgenograms. Pulmonary function studies usually have all the features of combined restriction, obstruction and a reduced single-breath diffusing capacity for carbon monoxide. This condition may progress to cor pulmonale and patients in whom it develops have a strikingly increased incidence of primary lung cancer.⁵

The clinical syndrome of lung disease caused by the inhalation of large quantities of cosmetic talcum appears to be indistinguishable from that of talc miner's pneumoconiosis. Nam and Gracey⁶ reported autopsy findings of talc-induced lung disease in an asymptomatic patient who had a long-standing history of heavy talcum use. Wells and co-workers⁷ reported a case of chronic talcosis of the lung diagnosed by open-lung biopsy in a patient who had a history of heavy talcum use as a dusting power. Fraser and Pare⁵ reported a case of a young woman who had inhaled large quantities of talc from her hands during a postpartum depression. When seen, she had had dyspnea on exertion for several months and interstitial infiltrates were reported on chest roentgenograms. Diagnosis was established by open-lung biopsy.

In contrast to adults, infants who inhale massive doses of cosmetic talc have acute respiratory distress due to bronchial impaction and bronchiolitis obliterans.⁹⁻¹¹ Cruthirds and associates¹² reported a case of a ten-year-old child who had dyspnea, frequent respiratory infections and widespread interstitial infiltrates on chest x-ray films. This patient had aspirated talc at the age of two. Histologic examination of tissue obtained at open-lung biopsy showed extensive fibrosis, inflammatory infiltrates with giant cells and many crystals that were refractile under polarized light. Gould and Barnardo¹³ reported a case of a seven-year-old girl who had acute respiratory distress after accidentally inhaling large quantities of powdered talc. Chronic bronchiectasis developed in this child and pulmonary function studies had all the features of both obstructive and restrictive defects.

Scanning electron microscopy with energy-dispersive x-ray analysis is ideally suited to the study of small specimens and the analysis of inhaled particulates that may be too small to see with a light microscope and too difficult to section for

conventional transmission electron microscopy. Once located with a scanning electron microscope, regions of interest are analyzed using x-rays emitted by the specimen, which have characteristic energies for individual elements. The technique allows the detection of minute quantities of inorganic material in tissue sections (as little as 10⁻¹⁷ grams), samples a greater volume of tissue than transmission electron microscopy (approximately 50 times greater) and provides specific information concerning the composition of the detected inorganic dust particles.⁸

In conclusion, cosmetic talcum powder inhalation may be associated with acute or chronic talcosis of the lung. The clinical syndrome of lung disease in adults associated with the inhalation of large quantities of cosmetic talcum powder closely resembles that of talc miner's pneumoconiosis. Cosmetic talc pneumoconiosis should be considered in the differential diagnosis of bilateral pulmonary infiltrates. Diagnosis may be established by transbronchial biopsy using scanning electron microscopy and energy-dispersive x-ray analysis.

Summary

Cosmetic talcum powder is not generally considered to be a health hazard. We report a case of pulmonary talcosis due to the intentional sniffing of cosmetic talcum powder. Diagnosis was made by transbronchial biopsy using energy-dispersive x-ray analysis.

REFERENCES

1. Morgan WKC, Seaton A: Occupational Lung Diseases. Philadelphia, WB Saunders, 1975, pp 113-115
2. Russell RS, Merz RD, Silverston JN: The determination of respirable particles in talcum powder. *Ed Cosmet Toxicol* 1979; 17:117-122
3. Cosmetic talc powder (Editorial). *Lancet* 1977; 2(8026):1348-1349
4. Henderson WJ, Blundell G, Richards R, et al: Ingestion of talc particles by cultured lung fibroblasts. *Environ Res* 1975 Apr; 9:173-178
5. Fraser RG, Pare JAP: Diagnosis of Diseases of the Chest—Vol 2, 2nd Ed. Philadelphia, WB Saunders, 1978, pp 1189-1195
6. Nam K, Gracey DR: Pulmonary talcosis from cosmetic talcum powder. *JAMA* 1972 Jul 31; 221:492-493
7. Wells IP, Dubbins PA, Whimster WF: Pulmonary disease caused by the inhalation of cosmetic talcum powder. *Br J Radiol* 1979 Jul; 52(619):586-588
8. Abraham JL: Diagnostic applications of scanning electron microscopy and microanalysis in pathology. *Israel J Med Sci* 1979; 15:716-722
9. Pfenninger J, D'Apuzzo V: Powder aspiration in children—Report of two cases. *Arch Dis Child* 1977 Feb; 62:157-159
10. Motomatsu K, Adachi H, Uno T: Two infant deaths after inhaling baby powder. *Chest* 1979 Apr; 75:448-450
11. Brouillette F, Weber ML: Massive aspiration of talcum powder by an infant. *Can Med Assoc J* 1978 Aug 26; 119:354-355
12. Cruthirds TP, Cole FH, Paul RN: Pulmonary talcosis as a result of massive aspiration of baby powder. *South Med J* 1977 May; 70:626-628
13. Gould SR, Barnardo DE: Respiratory distress after talc inhalation. *Br J Dis Chest* 1972 Jul; 66:230-233